

Bellwork: 1/24/13

Write an equation to solve the following word problem.

The length of a rectangle is 7in greater than the width. The perimeter is 50in. Find the dimensions of the rectangle.

$$\begin{array}{l} \text{7+x} \\ \text{x} \quad \boxed{} \quad \text{x} \\ \text{7+x} \end{array} \quad \begin{array}{l} \text{x} + \text{x} + \text{7} + \text{x} + \text{7} + \text{x} = 50 \\ 4\text{x} + 14 = 50 \\ \underline{-14 \quad -14} \\ 4\text{x} = 36 \\ \text{x} = 9 \\ 9\text{in} \times 16\text{in} \end{array}$$

width = 9in
length = 16in

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maximum or minimum \rightarrow looking for vertex
ground, how far, \rightarrow x-intercepts

Quadratic Applications Packet

Date: _____

Pd: _____

1. A manufacturer of lighting fixtures has a daily production cost of $C = 800 - 10x + 0.25x^2$ where C is the total cost (in dollars) and x is the number of units produced.

a) How many $\overset{\text{x}}{\text{fixtures}}$ should be produced each day to yield a $\overset{\text{Vertex}}{\text{minimum cost}}$?

$$\begin{array}{l} C = 800 - 10x + 0.25x^2 \\ C = 0.25x^2 - 10x + 800 \end{array} \quad \frac{-b}{2a} = \frac{10}{2(0.25)} = 20$$

Answer: Twenty fixtures should be produced to yield a minimum cost.

b) What is the $\overset{\text{Vertex } C=y}{\text{minimum cost}}$?

$$C = 800 - 10(20) + 0.25(20)^2 = 700$$

Answer: The minimum cost is \$700.

2. Shawn hit a foul ball straight up over home plate. The height of the ball over the level of the bat, $h(t)$, is given by the function $h(t) = 48t - 16t^2$ where t is the time in seconds after the ball left the bat.

If the catcher is going to attempt to catch the ball, how long does she have to get ready?

Answer: _____

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3. According to the Guinness Book of World Records, the longest pendulum in the world is 73 feet $9\frac{1}{2}$ inches. It was installed in Tokyo, Japan in 1983. The time in seconds, t , for the pendulum to swing back and forth is given by the formula $t^2 = 1.23L$, where L is the length of the pendulum in feet

- a) What is the length of time needed for this pendulum swing back and forth once?

Answer: _____

- b) How long should the pendulum be if you want it to swing back and forth exactly 15 times a minute?

Answer: _____

4. A deadly frog found in an area of the rain forest in western Columbia can be lethal even to the touch because it exudes a toxic substance. The equation $h(x) = -\frac{2}{27}x^3 + \frac{4}{3}x$ represents the path, or trajectory, that one of the frogs takes while hopping through the rain forest. In the equation x represents the distance in inches and $h(x)$ represents the height in inches.

- a) How far does the path of the frog's venom reach?

Answer: _____

- b) How high does the frog's venom reach?

Answer: _____

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5. The brick Oven Bakery sells more loaves of bread when it reduces its price, but then its profits change. The function $p(x) = -100(x - 1.75)^2 + 300$ models the bakery's profits, in dollars, where x is the price of a loaf of bread in dollars. The bakery wants to maximize its profit.

- a) Find the daily profit for selling the bread at \$2.00 per loaf.
 $p(x) = y$ $x = 2.00$

$$p(x) = -100(2.00 - 1.75)^2 + 300 = \$293.75$$

Answer: The daily profit is \$293.75

- b) Find the daily profit for selling the bread at \$1.25 per loaf.
 $p(x) = y$ $x = 1.25$

$$p(x) = -100(1.25 - 1.75)^2 + 300 = \$275$$

Answer: The daily profit is \$275.00

(1.75, 300)

- c) What price should the bakery charge to maximize its profit?
 x vertex

Answer: The bakery should charge \$1.75 per loaf to maximize its profits

- d) What is the maximum profit?
 $p(x) = y$ vertex

Answer: The maximum profit is \$300

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6. Jenna's bedroom has an area of 160 square feet. The length is 6 feet longer than the width. Find the dimensions of the room.

Answer: _____

7. The height y (in feet) of a ball thrown by a child is $y = -\frac{1}{12}x^2 + 2x + 4$ where x is the horizontal distance (in feet) from where the ball is thrown.

a) How high is the ball when it leaves the child's hand?

Answer: _____

b) How high is the ball when it is at its maximum height?

Answer: _____

c) How far from the child does the ball strike the ground?

Answer: _____

